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## Macroeconomic Determinants of Health Insurance Demand in Kenya: An Autoregressive Distributed Lag Modelling

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### **Abstract:**

Universal health coverage is key to the Kenyan government's 'big four' development agenda which is meant to be achieved by 2022. Over the years, health has always been given a higher priority and has been at the epicenter of political campaign manifesto. As a result, the government has continuously pumped resources into the health sector, and established public insurance scheme, as well as providing an enabling environment for private insurance companies in the spirit of achieving the objectives of better health care. However, insurance penetration is low with a 4 percent uptake of the private insurance and 16 percent uptake of public insurance. This low uptake has contributed to the huge out-of-pocket budgets and expenditures in Kenya, which sums up to approximately 26.1% of the percent of the overall healthcare expenditure in Kenya. This has contributed to an increase in the level of poverty as well as dependency ratios. This research aimed to look into the determinants of health insurance demand in Kenya using the Auto-regressive Distributed Lag (ARDL) Model. The research used secondary data spanning from 1980 to 2018. The study established that, income levels positively affects health insurance demand in the long-run, the effect is however, negative in the short-run. The study established that financial development has no effect on health insurance demand. Inflation rate negatively affects health insurance demand in the long run but a positive one in the short-run. Unemployment has a negative effect on health insurance demand both in the short-run and in the long-run. Finally, education level has a positively affects health insurance demand in the long-run but a negative relationship in the short-run.

**Keywords:** Health insurance demand, macroeconomic determinants, ARDL

### **1. Introduction**

Globally, health has gained considerable prominence and is widely regarded as a basic need for the sustainability of human life, and a precondition for optimal socio-economic development of human beings. Cross country studies have shown that health has two principal values; intrinsic and instrumental. Its value is intrinsic in the sense that sound health is an essential contributor to the well-being of an individual both in the body and in mind. On the other hand, it is instrumental as it affects economic growth and development as it directly impacts human capital and productivity, and indirectly alleviates poverty through reducing the economic burden of illnesses among households (Spaan et al., 2012). Health contributes to increased productivity in the workplace as a result of better nutrition, it reduces the employee turnover rate and hence production losses that may be caused by workers illnesses, and it also leads to less work-related accidents as healthy employees can concentrate (Sachs, 2011). Therefore, better healthcare for the citizens is a requirement for economic growth and poverty alleviation.

The global importance of health has been emphasized in the 'Universal Declaration of Human Rights,' depicting the right to health and medical services that has been highlighted among other 30 vital human rights. The importance has further been demonstrated in the recently concluded world agenda, i.e. Millennium Development Goals and was later on extended in the Sustainable development Goals (SDG) as goal-3, that seeks to ensure a universal free access to medical services around the world as well as promotion of the well-being for all at all ages by the year 2030 (Lim et al., 2016). In Kenya, health is considered as a basic necessity and is included among the items in the bill of rights in the 2010 constitution. Accordingly, better and affordable public healthcare has been on the forefront of the development agenda of the country both in the short term as highlighted in national big four agenda and the long term as stipulated in the national vision 2030 blueprint (Ministry of Health, 2014).

In spite of the priority given to healthcare agenda across the globe, its implementation, especially in Africa and other developing nations, has been faced with numerous challenges. Many of these challenges emanate from healthcare financing or lack of it thereof. Majority of developing economies struggle with the development of revenue streams to finance their healthcare systems. A majority also allocate little finances to the health sector as there has been increased overreliance on foreign funding and aid to fund some aspects of the healthcare such as treatment of communicable

diseases (Akosua & Aseweh, 2011).

The situation in healthcare financing in African and developing countries is further exacerbated by low Gross Domestic Products (GDP) levels, the ever-competing development needs as well as the increased recurrent expenditure at the time when income sources are shrinking. This has left many developing countries with limited capabilities of subsidizing health services, again, with the current global political and economic climate, the future of foreign aid is not promising. This has left the majority of households with little or no access to proper healthcare (The Economist Intelligence Unit, 2012).

The challenges mentioned above have led to massive reforms within the health sector and infrastructure with additional emphasis on the management in a number of countries in developing regions. Notably among the improvements is introduction of the social protection system mechanisms by the majority of the countries' institutions and governments. This has mostly been achieved through the establishment of National insurance schemes to enable the majority of the less fortunate citizens to access medical and healthcare services. The private sector is also playing a significant role in bridging the gap between health care provision and access by investing in health facilities as well as health insurance. The private sector has mostly targeted the expanding bracket of average to high-income earners of the population, that has the capacity and resources to afford better treatment than what is available in the public facilities (Spaan et al., 2012).

Social protection reduces financial barriers to quality medical services, thereby increasing access to medicine more conveniently. It has led to the provision of better healthcare facilities and protection of citizens from catastrophic costs that arise from out of pocket expenditures. Accordingly, this reduces the chances of a population becoming impoverished and falling into a poverty trap (World Health Organisation, 2011).

Although progress has been made in the implementation of reforms that are geared towards achieving universal healthcare through national health insurance schemes, recent global statistics have shown that out-of-pocket expenditure for healthcare is still high in the least developed countries (LDC) and developing countries. Low enrollment and retention rates in the social health insurance scheme have been cited as primary contributors for this. If the situation is left to continue the chances of achieving universal health coverage are very slim.

Just like its developing nations counterpart, Kenya's situation as far as enrolment and retention of insurance is concerned is not any different. Majority of Kenyans still finance their healthcare using out-of-pocket payments. Kenya has a relatively small proportion of its citizens with medical insurance. In a KPMG report of 2018, it was established that only 25 percent of the total number of Kenyans actually have general insurance covers; out of these 91 percent have the health insurance cover, with 81 percent being taken by the National Health Insurance Fund cover. The KPMG survey also established that most of the persons enrolled for the National Hospital Insurance Fund (NHIF) did so because it was a requirement during their application for their employment positions and contracts (KPMG, 2018). In Kenya, it is not mandatory for every citizen to enroll in the insurance scheme apart from those in formal employment and those without health insurance at all can still access public health services which are quite affordable. However, as is evident that the country's living costs are high, especially on housing and the purchase of food items, the public health service fails to meet their objective of providing an adequate level of social protection in health.

### *1.1. Research Problem*

Despite progress made within the health insurance sector, its uptake has been linked with lower demand. Only 20 percent of Kenyans have some sort of medical insurance cover, 4 percent covered by private health insurance while the general public health insurance covers 16 (%) percent of the total population (KNBS, 2016). The private insured 4 percent proportion is much lower compared to African frontiers such as South Africa that have about 14 percent of their population being privately insured (Abuya, Maina & Chuma, 2017).

A 2018 World Bank report showed that in 2017 OOP expenditure accounted for 26.1 percent of the total health financing in Kenya. The payments are very high in comparison to other states and countries such as Seychelles, Botswana and South Africa whose OOP were 2.3 percent, 5.2 percent and 6.3 percent of total healthcare expenditure respectively in 2017. According to the World Bank (2018), these kind of spending reduce consumption of other goods and services and therefore push the affected households into poverty which is brought about by the healthcare catastrophic costs. With many health insurance companies in Kenya and an array of policies, it begs the question of why there is low insurance demand in Kenya.

Several studies on Kenya's health insurance have mainly concentrated with the general state of the insurance industry with its institutions and the associated competition but has not majored in discerning the reason for the population's low uptake. Many studies have also paid attention to life insurance as opposed to health insurance. Studies on health insurance have also focused on micro determinants of health insurance (Namuhisa 2012; Mutinda, 2012; Kiplagat and Murithi, 2013; Orayo, 2014; Mburu, 2017; Kituku, Amata and Muturi, 2017). It is against this backdrop that this research aimed to establish the determinants of health insurance in Kenya, by focusing on the macroeconomic factors.

## **2. Literature Review**

The section reviews some of the related works and summarizes the results of the research that have been conducted on the relationship between health insurance demand and its macroeconomic determinant.

### *2.1. Theoretical Literature*

Pioneer works on the demand for health insurance were done as early as the beginning of 20th century by Marshal (1920) and fisher (1930) in their models of utility function. These theories are also referred to as the conventional theories

of health insurance demand and held that the concept of health insurance is akin to reducing the price of healthcare in the same manner that price reduction occurs exogenously in the market. The conventional theories compare insurance with the medical care subsidy as it reduces the general unit price of healthcare. Newman (1978) however, challenged this theory by stating that even though there is an income effect that is brought about by premiums and taxes paid to finance the insurance benefits, the net effect of the finance mechanism is empirically insignificant.

Pauly (1968) points out that a major implication of the conventional theory is that the marginal health care consumption as a result of insurance (moral hazard) is welfare minimizing. The welfare-loss proposition according to Pauly can be illustrated using the Marshallian demand curve for health insurance.

The weaknesses of the conventional theory have prompted a large number of health economists to focus on policies which inform reduction of consumption at the margin. Notably among them is Fieldstein (1973) who observed that the tax subsidy for employer-based health insurance led many households in the United State of America to spend too much on healthcare. In His conclusion he suggested that an increase in co-insurance would contribute to a rise in consumer's welfare. Other studies (such as Manning and Marquis, 1996; Feldman and Dowd, 1991) have also drawn the same inference.

Nyman (2001) asserts that perceiving health insurance as a price effect overlooks the origins of an insurance contracts as means of income transfer to those who are ill. He emphasizes that the ideal insurance agreement is voluntary tradeoff where consumers contribute premium and in return, they can make a claim on the collective premiums, in the event that they fall ill. Premiums is weighted on the probability of getting sick; the higher the likelihood of illness the higher the premium and vice versa. Welfare gain arises when there is a transfer of income from the people that remain healthy to those that become ill. It is this welfare gain caused by income transfer that prompts individuals to purchase insurance.

Nyman (2001) in his works on access theory for demand constructed the expected utility model to explain the demand for health insurance by individuals. He proposed that, unlike the conventional theory which assume that consumers demand health insurance to reduce financial uncertainty, they actually purchase health insurance because they exhibit a concave utility of wealth. The decision to purchase health insurance is specifically influenced by the expected utility to be derived from the insurance.

The theory by Nyman concludes by acknowledging that health insurance is a derived demand of health. As explained by the concept of utilities, individuals, in this case, Kenyan consumers, will always make a comparison between the benefits of purchasing insurance and health care expenditure without insurance given their attitude to risk which will mostly be influenced by social and economic shocks. Households will mostly purchase the insurance when the benefits outweigh the Out of Pocket payments (utility satisfaction). The benefits also become apparent when they fall ill, thus, their knowledge of future condition is likely to influence their decision to purchase health insurance.

## 2.2. Empirical Literature

Several of studies show that income is directly proportional to the demand for health insurance *ceteris paribus*. Health insurance purchase is expected to rise with an increase in income levels. Using Tobit regression model, Showers and Shotick (2012) found that income had a very significant relationship and a positive impact to the medical insurance premiums. They concluded that a rise in income increases the desire to purchase more health insurance, to get better and quality health care services. Yellaiah and Ramakrishna (2012) using logistic regression identified the main determinants for health insurance demand in India to be income and employment. Lee (2015) also established that GDP per capita which acted as a proxy variable for income significantly affected the health insurance penetration.

Outreville (2015) highlights that financial development in a country has a linear effect on medical insurance demand. This is supported by Beck and Webb (2002) who conducted a panel regression analysis on data from 68 countries of the world in the quest for establishing what causes the variation in health insurance demand among different countries. They found out that, countries with a higher per capita income, more developed financial sector and lower inflation rate had a higher amount of health insurance. The justification for this is that well-functioning financial and banking system increases consumer confidence, as stable banks can aid insurers to invest efficiently. Additionally, a vibrant financial system is deemed as an influencing factor to investment activities of insurance companies, consequently enhancing investment profit which go back to insurance companies and thus increases their scope of providing better services and policies. Masci (2007) asserts that, insurance companies commence their business operation with equity capital or debt financing, and with time raise funds through issuance of insurance policies which subsequently make policy holders act as investors in the market thereby leading to improvements in capital allocations and investment stimulations. Intuitively, if the financial system is robust chances are customers confidence will be boosted and ultimately the demand for health insurance.

Inflation rate has an inverse gradient with health insurance demand. The argument for this is that rational consumers know that inflation creates financial uncertainty and this makes consumers risk-averse. This adverse effect of inflation on health insurance demand has been shown by several studies yang et al., (2015); Haiss and Sumegi (2008). However, some studies have found the two variables not to be having any significant relationship (Chang et al., 2014 and Outreville, 2015). Consequently, the effect of inflation on health insurance demand is inconclusive.

Fronstin (2000) asserts that employment is a crucial determinant of purchasing a cover for medical insurance. In a household survey in the America household, the study established that majority of the people that reported not to be insured for health had a common characteristic and one of them being that most of them were unemployed. The study further suggested that one-third of the labor-force worked in the retail and wholesale trade and of these 41 percent of

them were also not insured for health. The study concluded that a majority of the unemployed population and informal sector workers have low health insurance coverage due to their low disposable income. Baek and DeVaney (2005) using cross-sectional data and ordinary least squares procedure found out that the occupation of the household head determined whether a household is insured or not if the head is formally employed then the higher the likelihood of the family possessing an insurance cover.

Kirigia et al., (2005) used logic regression in estimating the demographic, social and economic factors that contribute to the purchase of a medical insurance cover in South Africa. Their study established that the influence of level of education, income level, and employment were robust. Takeuchi et al., (1998) also used a logic regression model to analyze the factors that determine purchase of health insurance among Chinese-Americans in Los-Angeles; education and employment were found to be having a significant influence. People with a higher education level are more capable of appreciating and understanding the benefits of risk contingency. Medeiros-Garcia (2012) asserts that high education level tends to instill the risk-averse attitude in people and therefore increase their desire to insure themselves against future illnesses.

Kimani et al., (2012) while trying to study the factors that determine the purchase of medical insurance cover by women in Kenya, and using multivariate logistic regression, reveal that education and wealth status of the household had an important influence on health insurance ownership. Kiplagat and Muriithi (2013) using a multinomial logistic model using Kenya Demographic and Household Survey 2009 dataset found out that education and employment were significant in determining the choice of an insurance scheme that individuals were members.

### 3. Methodology

This section expounds on the study's methodological approach which comprises of, model specification, pre-diagnostic tests, post-diagnostic tests as well as sources and measurement of data.

#### 3.1. Theoretical Framework

This paper stems from the works of Stone (1954); Nerlove (1956) and Houthakker and Taylor (1970). The approach is a deviation of the traditional demand function which was based on the theory of consumer utility. Stone (1954) argued that the law of demand as it was, was not in a position to be used in analyzing macroeconomic phenomenon as it focused on individual consumers and commodities. Therefore, he proposed that demand functions should be formulated directly from the market data by analyzing the general income level and price level as this was more realistic and can be examined using many econometric methods. The approach aggregates demand function to represent the entire market behavior of the consumers. It is represented by the following equation:

$$Q_x = b_0 + P_x^{b_1} \cdot P_0^{b_2} \cdot Y^{b_3} \cdot e^{b_4} \quad 1$$

Where:

$Q_x$  = The total demand for product X

$p_x$  = The unit price of product X

$P_0$  = The price of closely related products

$Y$  = consumer total income

$e^{b_4}$  = Coefficient for preferences and taste of consumers

$b_1, b_2,$  and  $b_3$  Are elasticity coefficients. The constant elasticity of demand is derived from the fact that the three coefficients are assumed to remain constant and the demand function is homogenous of degree zero.

Nerlove (1956) extended the model to make it dynamic and incorporating the concept of distributed lags and applying it only to durable products. This yields the following equation:

$$Q_t = \alpha_1 Y_t + \alpha_2 Q_{t-1} \quad 2$$

The equation was used for products that are durable, and it was assumed that the quantity purchased of a commodity depends entirely on current aggregate income as well as the quantities purchased in the previous period. The assumption is that consumers will demand fractions of the durable commodities until they acquire the desired stock of that commodity.

Houthakker and Taylor (1970) extended the Nerlove's idea of stock adjustment to products that are not durable; and for the sake of this study, health care insurance. Health insurance is considered non-durable as premiums subscriptions expire after every year or month. According to Houthakker and Taylor, the current demand of non-durables can be influenced by past behavior, i.e. previous income and previous demand levels which eventually leads to a habit formation. They, therefore, named their approach 'habit creation principle' and expressed the demand function as a distributed lag model of income and other variables that may affect a commodity. The demand function is expressed in the form:

$$Q_t = \alpha_0 + \alpha_1 P_t + \alpha_2 \Delta P_t + \alpha_3 Y_t + \alpha_4 \Delta Y_t + \alpha_5 Q_{t-1} \quad 3$$

Where  $\Delta Y_t$  is the adjustment in aggregate income, while  $\Delta P_t$  is the adjustment in aggregate price level between period  $t$  and period  $t - 1$ .

#### 3.2. Model Specification

Based on the theoretical framework and empirical literature, health insurance demand is a function of income level, inflation rate, financial development, unemployment rate, and level of education. Accordingly, the empirical model is specified as:

$$HID_t = \beta_0 + \beta_1 Y_t + \beta_3 \pi_t + \beta_2 FD_t + \beta_4 UMP_t + \beta_5 EDU_t + \mu_t \quad 4$$

Where  $HID_t$  is Health insurance demand,  $Y_t$  is the level of income,  $\pi_t$  inflation rate,  $FD_t$  financial development,  $UMP_t$  unemployment rate,  $EDU_t$  education level,  $\mu_t$  is the stochastic error term.

The study, however, stems from the works of Houthakker and Taylor (1970), who analyzed the demand for non-durable commodities and concluded that their demand can be influenced by past behavior of income and price. Health insurance can be categorized as a non-durable commodity as it requires annual or monthly subscription, for this reason, the study will adopt the demand function proposed by Houthakker and Taylor (1970) in equation 3.3. Model 3.4 will therefore be re-parameterized into a distributed lag model. In that regard, the model will include the lags of the dependent variables as well as the dependent variables to become an Autoregressive Distributed Lag model (ARDL). The model to be analyzed thus becomes:

$$\Delta HID_t = \beta_0 + \delta HID_{t-1} + \alpha X_t + \sum_{i=1}^q \vartheta \Delta HID_{t-i} + \sum_{i=1}^p \theta \Delta X_{t-i} + \mu_t \quad 5$$

Where:

$\Delta$  represents the operator after the first difference

$q$  denotes lag order for the health insurance demand selected based on AIC

$p$  is the lag order for the explanatory variables, selected based on AIC

$X_t$  is a set of explanatory variables which includes, level of income, inflation rate, financial development, unemployment rate, and education level

$X_{t-i}$  is the lag of the explanatory variables, select based on Akaike Information Criteria (AIC)

$HID_t$  is Health Insurance Demand (Dependent variable)

$HID_{t-1}$  is the lag of Health Insurance demand

$\beta_0$  is the drift parameter,

$\mu_t$  is the error term.

The parameters  $\vartheta$  and  $\theta$  are short-run parameters

$\delta$  and  $\alpha$  are the long-run multiplier

Advantages of the ARDL approach is that all the series are estimated as stationary as long as they are integrated of order zero or order one and therefore, allows all variables to be analysed using simple OLS estimation (Harris & Sollis, 2003). Additionally, ARDL allows for analysis of the dynamics of the cointegrated variables irrespective of the time period. As it provides valid inferences despite the presence of endogenous variables in the model, and appropriate for small sample size of less than 60 (Bahmani-Oskooee, 2001).

#### 4. Estimation and Interpretation of Results

The section presents empirical analysis by use of diagnostic tests. The chapter contains analysis of results, their interpretation as well as discussion in relation to the empirical literature.

##### 4.1. Unit Root Test

Time series data is inclined to suffer from the problems of non-stationarity, a situation where, there is no constant mean and variance across the series. It is therefore important to conduct stationarity test so as to prevent the cases of false regression (Narayan, 2005). For the sake of robustness, this study used ADF and Phillips Perron approaches in unit root diagnosis. The results are as presented in Table 1.

Variables	ADF Test Z(t)		PP test Z(t)		Order of Integration
	At level	First Difference	At level	First Difference	
HID	1.357	-4.756 ***	1.525	-4.644 ***	I (1)
RGDP	-5.077 **	-7.843 ***	-5.017 **	7.483 ***	I (0)
FD	-1.613	-7.301 ***	-1.571	-7.264 ***	I (1)
INF	-3.158 **	-6.262 ***	-3.159 **	-6.475 ***	I (0)
UNMP	-0.818	-5.767 ***	-0.886	-5.782 ***	I (1)
EDUC	0.883	-7.197 ***	1.510	-7.223 ***	I (1)

Table 1: Unit Root Results

\*\*\* Coefficient is Significant at 1 percent (2-tailed)

\*\* Coefficient is significant at 5 percent (2-tailed)

Table 1 shows unit root diagnosis. It is evident that per capita GDP and inflation rate are stationary in levels. The other variables, health insurance demand, financial development, unemployment and education were not stationary in levels and they were differenced for stationarity. They are therefore, integrated to order one All the variables have met the conditions to be estimated using ARDL approach which requires variables to be integrated of either order 0 or 1, however, the analysis is run in levels (Harris & Sollis, 2003).

#### 4.2. Lag Selection

The ARDL model is sensitive to lag lengths and therefore key to find out the optimal lag length prior to carrying out ARDL model estimation. In this study, lags were chosen using the Akaike Information Criteria (AIC) as the approach is ideal for relatively lower sample size of fewer than 60 observations. Results are as displayed in Table 2.

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-1.56504				6.2e-08	.432288	.524329	.698919
1	202.895	408.92	36	0.000	4.2e-12	-9.19397	-8.54969	-7.3276*
2	250.347	94.905	36	0.000	2.7e-12	-9.84841	-8.65188	-6.3822
3	299.669	98.644	36	0.000	2.2e-12*	-10.6097	-8.8609	-5.54368
4	356.292	113.25*	36	0.000	2.7e-12	-11.781*	-9.4871*	-5.12236

Table 2: Lag Selection

From Table 2 it can be deduced that the maximum lag length is 4, as indicated by the asterisk Akaike Information Criteria (-11.781\*). The same maximum lag is also suggested using Hannan Quinn Information criteria (-9.4871\*) and the Likelihood ratio (113.25\*).

#### 4.3. Cointegration Test

After carrying unit root test there is importance to conduct cointegration test to see the movement of variables in the long-run. This research uses the ARDL Bounds test. Using this method, cointegration is ascertained when the joint the F-statistics of lagged levels of the variables and the t-test of lagged dependent variable are significant. Cointegration analysis are displayed Table 3.

Test	10 percent		5 percent		1 percent		P-value	
	1(0)	1(1)	1(0)	1(1)	1(0)	1(1)	1(0)	1(1)
F statistic	2.462	3.966	3.030	4.779	4.455	6.800	0.023	0.124
t- statistic	-2.424	-3.736	-2.818	-4.217	-3.637	-5.217	0.003	0.055
F = 3.715								
t = -4.148								

Table 3: Bounds Cointegration Test

The F- statistic 3.715 is higher than critical values of I (1) regressors, while, t-statistics -4.148 is less than the critical values of I (1) regressors. The null of no cointegration is rejected and concludes the model containing health insurance demand, GDP per capita, inflation rate, unemployment and level of education exhibits a long-run relationship.

#### 4.4. Regression Results

The model estimated an ARDL (1, 3, 1, 2, 2, and 3) regression using levels data as per Akaike Information Criterion. ARDL procedure produces long-run and short-run parameter estimates. They are respectively displayed in Table 4 and Table 5

	Coefficient	Std. Error	t	P-value
<b>Long-Run Estimates</b>				
Ln_RGDP	2.3068	0.6045	3.82	0.001
Ln_FD	0.5860	0.7310	0.80	0.433
Ln_INF	-0.2261	0.0853	-2.65	0.016
Ln_UNMP	-0.5159	0.1126	-4.57	0.000
Ln_EDUC	3.7825	0.5463	6.92	0.000
ARDL Estimates				
Model	ARDL (1,3,1,2,2,3) regression			
R-squared	0.7112			
Adjusted R-squared	0.4385			

Table 4: Long-run Regression Results

The coefficient of determination of the entire model is 0.7112, this implies that 71.12 percent of changes in health insurance demand is determined within the model while the rest, 28.88 percent is explained by external factors. The model is said to be a good fit.

The estimated long-run coefficient for GDP per capita is 2.3068, and statistically significant at 1 percent. These findings are an indication that a percentage rise in GDP will contribute to a 2.3 percent rise in health insurance demand, and vice versa. GDP per capita is an indication of rising income levels of individuals in the country. The higher it is the more individuals will shift their consumption patterns from purchases of basic products such as food, shelter, and clothing to purchases of precautionary products such as health insurance or other types of insurance. The findings agree with the works of Showers and Shotick (2012) who found that income had a linear impact on medical insurance premiums. The study also conforms to the study of Yellaiah and Ramakrishna (2012) who established income as a critical factor influencing health insurance demand.

The estimated long-run coefficient for financial development is 0.5860, an indication that a 10 percent rise in broad money which is a proxy for financial development would cause a 5.8 percent rise in health insurance demand, and vice versa. However, these results are not significant. Similarly, as expected, the parameter estimate for inflation is -0.2261, a 10 percent rise in the level of inflation would lead to a 2.2 percent reduction in health insurance demand and vice-versa. The justification is that the inflation rate makes the prices of basic commodities expensive and people would prefer to purchase basic items and consider insurance as secondary need. Additionally, inflation creates financial uncertainty and this makes consumers risk-averse, and therefore they will reduce their insurance uptake and opt to hold their money. The findings conform to the works of yang et al., (2015) and Haiss and Sumegi (2008), who established a decreasing association between inflation rate and health insurance demand.

The long-run coefficient for unemployment is -0.5159, this indicates that a 10 percent rise in the rate of unemployment would cause a 5.1 percent fall in health insurance demand and vice versa. These results are significant at 1 percent. The justification is that unemployment reduces disposable income of individuals and therefore they cannot afford insurance. The study is in line with the works of Fronstin (2000) who asserts that employment is a crucial determinant of purchasing a cover for medical insurance.

The long-run coefficient for the level of education is 3.7825, meaning that a 1 percent rise in the population that complete secondary school education would lead to 3.7 percent in health insurance demand. The argument for this is that education creates enlightenment among people and therefore they are able to understand the importance of health insurance. The findings conform to the works of Kimani et al., (2012) who assert that education level is important in determining health insurance ownership.

	Coeff	S.Error	t	P-value
ADJ				
Ln_HID				
L1.	-0.8548	0.2061	-4.15	0.001
Ln_RGDP				
D1.	3.5927	2.3076	1.56	0.137
LD.	0.2936	2.4287	0.12	0.905
L2D.	-4.4969	2.1595	-2.08	0.052
Ln_FD				
D1.	0.8035	0.6155	1.31	0.208
Ln_INF				
D1.	0.1938	0.0955	2.03	0.058
LD.	0.1301	0.0752	1.73	0.101
Ln_UNMP				
D1.	-0.6218	0.3026	-2.05	0.055
LD.	0.4282	0.2353	1.82	0.086
Ln_educ				
D1.	-2.5304	0.7340	-3.45	0.003
LD.	-3.8263	1.2258	-3.12	0.006
L2D.	0.9214	0.7153	-1.29	0.214
cons	9.5458	2.9728	3.21	0.005

Table 5: Short-run Regression Results

Table 5 presents the short-run findings. The speed of adjustment coefficient is -0.8548 and significant at 1 percent. This confirms the presence of long-run connection which had previously been obtained using ARDL Bounds cointegration procedure. Precisely, the results depict that any divergence in the long-run equilibrium of the previous period are corrected at 85.48 percent adjustment rate per annum (Pesaran et al., 1996).

The constant-coefficient is 9.5458, this shows that health insurance demand is 9 percent ceteris paribus. The short-run coefficient of GDP per capita is 3.592, the first lag coefficient is 0.2958, while the coefficient for the second lag is -4.4969. It is only the coefficient for the second lag that is significant at 10 percent. Meaning that GDP per capita of the previous 2 years would have an inverse effect on the current health insurance demand. These results, however, disagree with the works of Lee (2015) who established that GDP per capita which acted as a substitute for income positively affected the health insurance demand.

The short-run coefficient for Financial development is 0.8035 this can be interpreted as a 10 percent rise in financial development would result to an 8.035 percent increase in health insurance demand. These results are however

not significant at any level. The short-run parameter estimate of the rate of inflation was 0.1938, this demonstrates that a 10 percent increase in inflation rate will contribute to a 1.98 percent improvement in health insurance demand. The result disagrees with empirical and theoretical findings. The justification for the result could be that it may take some time for the impact of inflation to be felt, inflation caused by increase in money supply might make individuals purchase more insurance in the short term. The short-run coefficient for the first lag of inflation rate is 0.130, however, this is insignificant at any level.

The unemployment rate has a short-run coefficient of -0.6219, which is significant at 10 percent. It is expected that unemployment would make it expensive to afford health insurance coverage. The findings are consistent with the study by Baek and DeVaney (2005) which found out that the occupation of the household head determined whether a household is insured or not. When the head is formally employed then there is a higher likelihood of the family possessing an insurance cover. The coefficient of the first lag is 0.4282 and significant at 10 percent an indication that unemployment of previous year is expected to lead to a proliferation in health insurance demand in the current year. This result does not conform to empirical and theoretical literature.

Finally, the short-run parameter estimate of education was -2.5304 and significant at 5 percent. The results mean that a percentage rise in education level would result in a 2.5 percent decrease in health insurance demand. Similarly, the first difference in education is significantly negative with a parameter estimate of -3.8263. The findings demonstrate that a 1 percent rise in education level would reduce health insurance demand by 3.826 percent. The findings are not in line with theory, they disagree with studies by Takeuchi et al., (1998) and Medeiros-Garcia (2012). These studies inferred that people with higher education are more capable of appreciating and understanding the benefits of risk contingency. An explanation for the varied results obtained in this study could be that, in the short-run individuals that complete school may take a while before getting a source of income, however, this situation changes in the long-run.

#### 4.5. Post estimation Tests

This segment displays the results obtained after conducting post estimation analysis. The analysis were conducted after regression analysis to ascertain whether the model was robust and the estimates can are sufficiently fit in explaining the subject. The results are displayed in Table 6

Test	Coefficient
Breusch-Godfrey LM test for autocorrelation	Chi2 =0.371 Prob > chi2=0.5424
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	Chi2=1.12 Prob > chi2=0.900
Ramsey RESET test	F (3, 32) = 0.537 Prob > F = 0.4200

Table 6: Post Estimation Diagnostic Test

Results in Table 6 show post estimation tests. Autocorrelation was conducted using the Breusch-Godfrey test, the P-value obtained was 0.5424 meaning that null hypothesis which is no correlation be accepted. Breusch-Pagan / Cook-Weisberg test was used for heteroskedasticity, the P-value obtained was 0.900, accepting the null of constant variance and concluding that the model is homoscedastic. Model specification used the Ramsey RESET test, a P-value of 0.4200 was attained indicating that the null should be accepted and conclude that there is no omission of variables in the analysis. The model of Health insurance demand, GDP per capita, inflation, unemployment, and education did not violate the Ordinary Least Square assumptions.

## 5. Conclusion and Recommendation

This section contains a highlight of the document, and conclusions that can be inferred from the study and policy recommendations.

### 5.1. Conclusion

In the short-run, financial development did not have an effect on health insurance demand at any statistical level. The inflation rate has significant effect on the health insurance demand. The first lag for inflation had insignificant effect on health insurance demand. Unemployment rate had an inverse and important effect on health insurance demand in levels, however, this was positive in its first lag. Finally, education level negatively affected health insurance demand both in levels and first lag. It can be concluded that the aim of the research of establishing the determinants of health insurance demand in Kenya, has been achieved. The framework of the study conceptualized that income levels, financial development, inflation rate, unemployment rate and education levels as macroeconomic determinants of health insurance demand in Kenya.

### 5.2. Policy Recommendation

As established by the findings, that income level positively affects health insurance demand in the long-run, the government should put measures in place to support, the growth of individual income which will eventually lead to high aggregate income, and thus influence health insurance demand. The inflation rate has an adverse impact on health



insurance demand, the central bank of Kenya should strive to ensure that the rate of inflation is low. The government should also create more jobs for the youth, this will boost income levels and make majority of Kenyans afford health insurance. It is vital that the government ensures that it promotes literacy levels by make it affordable to attain education. An educated population comprehends the benefits of health insurance and risk contingency.

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